LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Sept. 10-14, 2012

The Washington Post SUPPLY AND DEMAND

Windmills in California.

Wind power supplies about 4.1 percent of electric power in the United States. Yet there is enough wind potential to deal with the entire world's energy demands.

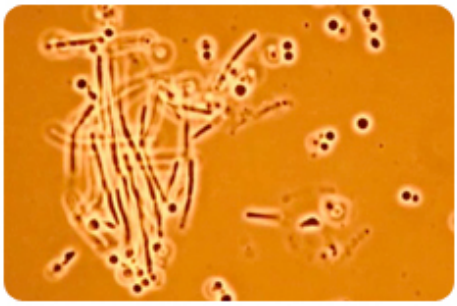
A new Lawrence Livermore study shows that there's enough wind potential both on the Earth's surface and up in the atmosphere to power human civilization 100 times over.

Right now, humans use about 18 terawatts of power worldwide. The study found that about 400 terawatts of wind power could be extracted from the Earth's surface and 1,800 terawatts of power from the upper atmosphere.

But the future of wind energy is likely to be determined by economic, political and technical constraints rather than geophysical limits, according to Kate Marvel, lead author of the study and a scientist in the Laboratory's Program for Climate Model Diagnosis and Intercomparison.

To read more, go to the *Washington Post*.

WTOP BACK OFF BACTERIA



Antibiotic resistant bacteria may one day be a thing of the past.

Laboratory researchers have discovered a novel way to combat antibiotic resistant bacteria by using the bacteria's own genes.

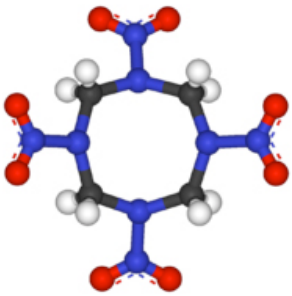
Despite the advances made to antibiotics over the years, the list of antibiotic resistant bacteria is growing and becoming one of the world's most serious health concerns. Infections once routinely treatable have now become more difficult to combat and potentially more lethal.

Matt Coleman, a Laboratory senior scientist, said that a gene that encodes for a protein that is able to digest bacterial cell walls may open the door to a number of new specifically targeted antibiotic treatments.

"Every bacteria cell wall requires this internal protein probably so it can divide, so we decided to go head and clone that protein," Coleman said. "We added that protein back to the bacteria and we suddenly realized that it was very effective in real time at killing the bacteria."

To hear more, go to WTOP-DC Radio.

R&D A BETTER EXPLOSIVE



The atomic makeup of the explosive HMX.

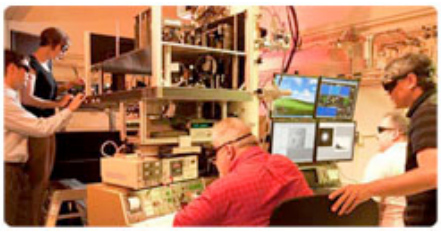
Borrowing a technology used to improve the effectiveness of drugs, scientists are reporting the discovery of a new explosive more powerful than the current state-of-the-art explosive used by the military, and just as safe for personnel to handle.

The Lab's Phil Pagoria and colleagues at the University of Michigan discovered that a technique for engineering medicines and other materials, termed cocrystallization, also is a way to make improved explosives, rocket propellants and fireworks.

Most solid materials consist of crystals -- with atoms and molecules arranged in a specific pattern that repeats itself time and again. Cocrystallization involves combining two materials into a new crystal architecture with the goal of producing an improved material.

To read more, go to *R&D Magazine*.

COMMERCIALIZE AND THEY WILL WIN



Shown from left to right, researchers Bryan Reed, Melissa Santala, William DeHope, Thomas LaGrange and Joseph McKeown operate the Dynamic Transmission Electron Microscope (DTEM) at the Laboratory.

Laboratory researchers and the Lab's economic development director have received three regional awards for technology transfer by the Federal Laboratory Consortium.

Started in 1974, the consortium assists the U.S. public and private sectors in utilizing technologies developed by federal government research laboratories.

LLNL shared in awards for the development of a new breast cancer diagnostic system, the commercialization of a transmission electron microscope, and the work of an innovation center that assists small firms in advancing transportation or renewable energy technologies.

To read more, go to the Web.

THE BOY WHO PLAYED WITH FUSION

Zhi Liao and Tom Anklam of NIF, flanking Taylor Wilson, discuss the Master Oscillator Room at NIF.

Taylor Wilson stood at the front of the auditorium, shifting from foot to foot and adjusting his suit sleeves like any other 18-year-old boy. His constant physical energy mirrors his ceaseless pursuit of net-energy fusion, a topic not many other teenage boys could discuss with any level of prowess.

At age 14, Wilson built his first successful fusion reactor, earning him the title of "The Boy Who Played With Fusion."

Earlier this month, Wilson visited the Lab to tour the National Ignition Facility (NIF), speak with researchers and share his life's work thus far.

Once the idea to build a fusion reactor in his parent's garage was rooted in his mind, Wilson completed his work in less than four years. As he pointed out, as if to humble his own efforts, the inventor of the television discovered a reactor as a viable source of neutrons when he was only 14 as well. Wilson's reactor works, but cannot create net energy -- a task NIF sets out to accomplish.

To read more, go to the Web.

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full weight of the nation's science and technology community to bear on solving problems of national importance.

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